

HIV Molecular Immunology 2001

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PREFACE

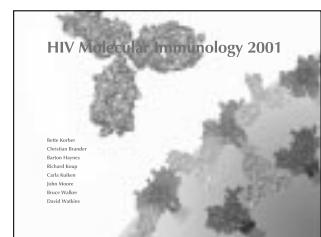
Scope and Purpose of the HIV Molecular Immunology Database

HIV Molecular Immunology (formerly called *HIV Molecular Immunology Database*) was added as a companion volume to the NIAID, Division of AIDS-funded *Human Retroviruses and AIDS Genetic Sequence Compendium* in 1995. This publication, the 2001 issue, is the printed version of the Web-based *HIV Immunology Database* (<http://hiv-web.lanl.gov/immunology>). Included herein are T-cell epitope tables and maps on HIV proteins, and annotation, as well as a map of linear B-cell epitopes and a summary of monoclonal antibodies with discontinuous epitopes. Alignments of CTL, helper T-cell, and antibody epitope are available only on our web site at <http://hiv-web.lanl.gov/immunology>. The annotation includes information such as how specific epitopes were experimentally defined, HLA specificities for T-cell epitopes, isotypes of monoclonal antibodies, the initial antigenic stimulus immunogen, and brief notes describing the context in which a given epitope was studied. The compendium begins with review articles relevant to the immunology of HIV. Comments on the database or requests for the hard copy can be sent via email to immuno@t10.lanl.gov.

Citing the Database

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The Cover



One of the important achievements in the field of HIV immunology in 2001 was the determination of the crystal structure of IgG b12, an antibody specific for the CD4 binding site on HIV-1. The antibody b12 is one of the few broadly cross-reactive antibodies capable of neutralizing HIV-1. Improved understanding of the structural relationships between b12

and the HIV-1 envelope may enable strategies for vaccine design that would allow better exposure of the b12 epitope on antigens designed for vaccine development.

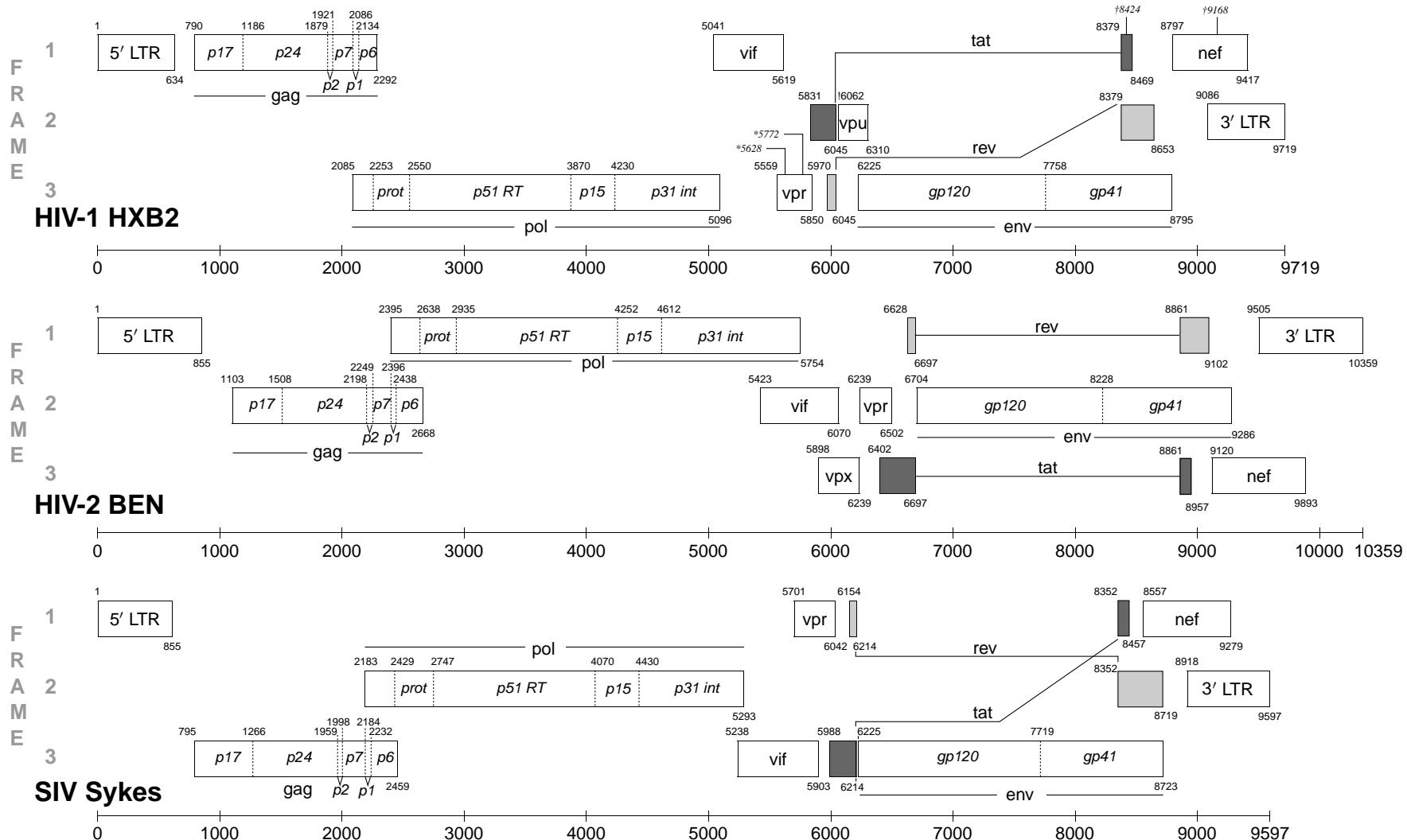
The cover picture is a stylized representation of the b12 antibodies bound to envelope proteins on the surface of an HIV-1 virion, in the process of neutralization.

The cover illustration was graciously provided by:

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- [1] Saphire EO, Parren PW, Pantophlet R, Zwick MB, Morris GM, Rudd PM, Dwek RA, Stanfield RL, Burton DR, Wilson IA, Crystal structure of a neutralizing human IgG against HIV-1: a template for vaccine design, *Science* 2001 Aug 10, **293**(5532):1155–9.
- [2] Saphire EO, Parren PW, Barbas CF 3rd, Burton DR, Wilson IA, Crystallization and preliminary structure determination of an intact human immunoglobulin, b12: an antibody that broadly neutralizes primary isolates of HIV-1, *Acta Crystallogr D Biol Crystallogr* 2001 Jan, **57**(Pt 1):168–71.
- [3] Saphire EO, Stanfield RL, Crispin MD, Parren PW, Rudd PM, Dwek RA, Burton DR, Wilson IA, Contrasting IgG structures reveal extreme asymmetry and flexibility. *J Mol Biol.* 2002 May 24, **319**(1):9–18.

Genome Maps



Landmarks of the HIV-1, HIV-2, and SIV genomes. The gene start, indicated by the small number in the upper left corner of each rectangle normally records the position of the *a* in the *atg* start codon for that gene while the number in the lower right records the last position of the stop codon. For *pol*, the start is taken to be the first *t* in the sequence *tttttttag* which forms part of the stem loop that potentiates ribosomal slippage on the RNA and a resulting -1 frameshift and the translation of the gag-pol polyprotein. The *tat* and *rev* spliced exons are shown as shaded rectangles. In HXB2, *5628 and *5772 mark positions of frameshifts in the *vpr* gene; !6062 indicates a defective *acg* start codon in *vpu*; †8424, and †9168 mark premature stop codons in *tat* and *nef*. See Korber *et al.*, Numbering Positions in HIV Relative to HXB2CG, in *Human Retroviruses and AIDS*, 1998 p. 102. Available from <http://hiv-web.lanl.gov/content/hiv-db/HTML/reviews/HXB2.html>

HIV/SIV PROTEINS

Name	Size	Function	Localization
Gag MA	p17	membrane anchoring; env interaction; nuclear transport of viral core. (myristylated protein)	virion
CA	p24	core capsid	virion
NC	p7	nucleocapsid, binds RNA	virion
	p6	binds Vpr	virion
Protease (PR)	p15	gag/pol cleavage and maturation	virion
Reverse Transcriptase (RT)	p66, p51	reverse transcription	virion
RNase H	(heterodimer)	RNAse H activity	virion
Integrase (IN)		DNA provirus integration	virion
Env	gp120/gp41	external viral glycoproteins bind to CD4 and chemokine co-receptors	plasma membrane, virion envelope
Tat	p16/p14	viral transcriptional transactivator	primarily in nucleolus/nucleus
Rev	p19	RNA transport, stability and utilization factor (phosphoprotein)	primarily in nucleolus/nucleus shuttling between nucleolus and cytoplasm
Vif	p23	promotes virion maturation and infectivity	cytoplasm (cytosol, membranes) virion
Vpr	p10-15	promotes nuclear localization of preintegration complex, inhibits cell division, arrests infected cells at G2/M	virion nucleus (nuclear membrane?)
Vpu	p16	promotes extracellular release of viral particles; degrades CD4 in the ER; (phosphoprotein only in HIV-1 and SIVcpz)	integral membrane protein
Nef	p27-p25	CD4 and class I downregulation (myristylated protein)	plasma membrane, cytoplasm, (virion?)
Vpx	p12-16	Vpr homolog present in HIV-2 and some SIVs absent in HIV-1	virion (nucleus?)
Tev	p28	tripartite tat-env-rev protein (also named Tnv)	primary in nucleolus/nucleus

Abbreviations

Common abbreviations used in this database.

Abrev.	Meaning	IN	Integrase
Ab	Antibody	Ig	Immunoglobulin
ADCC	Antibody-Dependent Cell-mediated Cytotoxicity	MAb	Monoclonal Antibody
ADE	Antibody-Dependent Enhancement	MHC	Major Histocompatibility Complex
APC	Antigen Presenting Cell	MRC	Medical Research Council, UK
AZT	Azidothymidine	NAb	Neutralizing Antibody
CD4BS	CD4 Binding Site	NIBSC	National Institute for Biological Standards and Control, UK
CD4i	Antibody that has enhanced binding to gp120 in the presence of SCD4 (CD4 induced)	NIH	National Institutes of Health
CSF	Cerebrospinal Fluid	PBLS	Peripheral Blood Lymphocyte
CTL	Cytotoxic T Lymphocyte	PBMC	Peripheral Blood Mononuclear Cell
CTLp	CTL precursor	PR	Protease
DTT	Dithiothriitol	RAC	Ricin A Chain
EIA	Enzyme Immuno Assay	rec/r	recombinant
ELISA	Enzyme Linked ImmunoSorbent Assay	RIP	Recombinant Identification Program
ER	Endoplasmic reticulum	RIPA	Radio Immuno Precipitation assay
Fabs	Fragment Antigen Binding-univalent antibody fragment	rsgp160	recombinant soluble gp160
FIV	Feline Immunodeficiency Virus	RT	Reverse Transcriptase
gp	Glycoprotein	sCD4	soluble CD4
HIV	Human Immunodeficiency Virus	SDS	Sodium Duodecyl Sulfate
HLA	Human Leukocyte Antigens	SIV	Simian Immunodeficiency Virus
HLA-MHC	Human Leukocyte Antigens-Major Histocompatibility Complex	Th	T-helper cell
IFN	Interferon	TNF	Tumor Necrosis Factor
		VLP	Virus like particle, assembled from p55 gag
		VV	Vaccinia virus
		WB	Western Blot